Advanced Component Technology Program Accomplishments

Presented to the TST

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Advanced Component Technology Program

- **Program Objectives**

  Identify, develop and demonstrate component and subsystem technologies which:
  - Reduce the risk, cost, size and development time for Earth observing instruments, platforms and information system and,
  - Enable new Earth observation measurements.

- **Current Programs**
  - **Advanced Technology Initiatives Program (ATIP)**
    - NRA released by NASA HQ in Sept 1999
    - 24, 3-year tasks selected in Jan 2000
    - Expected completion FY 2003/2004
  - **Advanced Component Technology Program (ACT)**
    - NRA released by NASA HQ in March 2002
    - 14, 3-year tasks selected in Aug 2002
    - Budget approximately $13M
    - Expected completion FY 2005/2006

SAR On-board Azimuth Pre-Filter (AzPF) Processor

PI: Mimi Gudim, JPL
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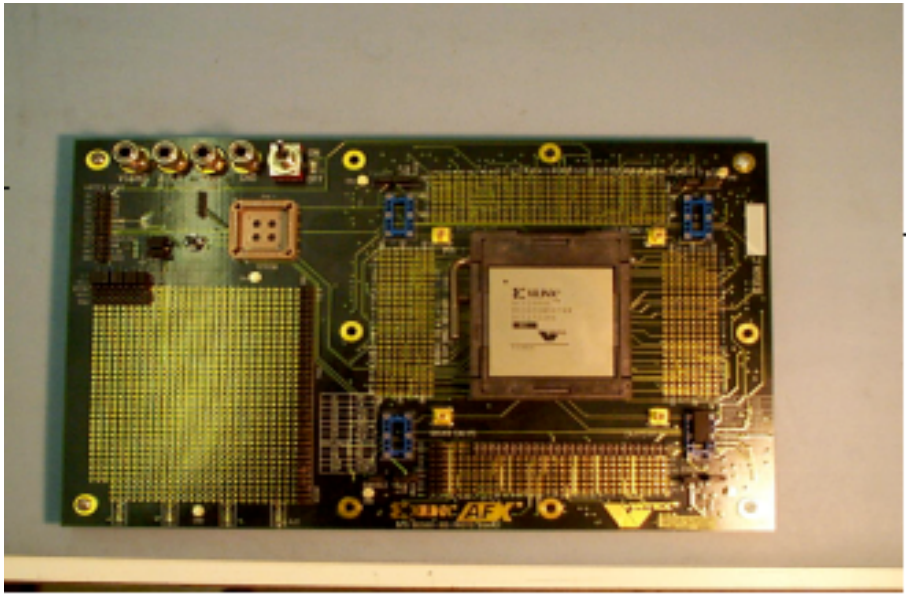
Objectives

- Use high density FPGA technology to develop a prototype on-board azimuth pre-processing filter for SAR systems, to reduce down linked data volume by a factor of 4 or more.
- Tailor the architecture to allow incorporation of processor into future SAR missions, encourage the SAR community to move toward on-board real-time processing of radar data.

Accomplishments

- Defined a system concept for down linked data reduction by a factor of 4 or more (selectable factor) using Azimuth Prefilter
- Developed behavioral models for the Azimuth Prefilter
- Completed prototype hardware implementation
  - SAR azimuth prefilter (AzPF) on single chip
  - <1W power consumption
  - Chip size: 4.25cm x 4.25cm
- Developed a real time input/output (Wildstar) to enable real time (up to 100MHz) sampling rate) test of AzPF with real-time input data created from a file and written back to a file
- Successful validation of AzPF hardware performance real-time at 100MHz sampling rate



Future Opportunities

•Currently interfacing with David Imel (Technical Group Supervisor for the AIRSAR group) and team:
- collaborating to verify AsPF with actual SAR data
- collaborating for a follow-on proposal to augment current filter with doppler-processing, and process data real-time in and AIRSAR flight

•AzPF included in Mars Scout proposal lead by Tony Freeman and Louise Velleiux

Development of Monolithic GaAs Hyperspectral Infrared QWIP Imaging System

PI: Dr. Murzy Jhabvala, GSFC
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Objectives

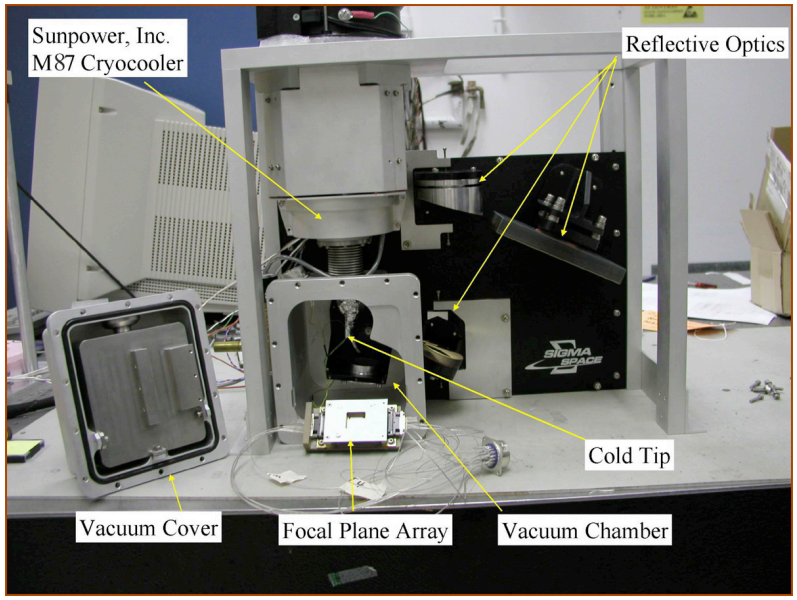
- Design and fabricate a completely monolithic four band, 512x640, GaAs Quantum Well Infrared Photodetector (QWIP) imaging array.
- Design and develop a linear variable etalon that will provide hyper-spectral imaging in each of the four bands (a total of 209 sub-bands).

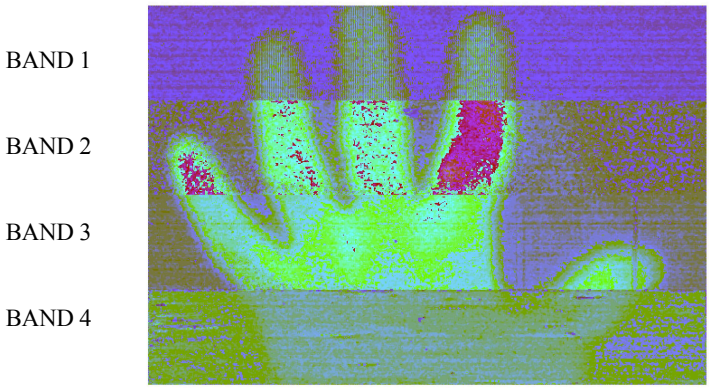
Accomplishments

- Developed a 4-band, 3-15um, 512 x 640 QWIP array and a hyperspectral LVE
- Successfully designed and built an aircraft worthy, self contained, mechanically cooled camera system operating at 43K
- Obtained full hyperspectral image capability

Future Opportunities

- Currently negotiating (through NASA HQ) agreement with Thailand to establish a research effort using this technology to evaluate a variety of environmental phenomenon using low flying aircraft
- Interest from the medical community using QWIP detectors in to non-invasively identify cancers
- GOES Project interested in using QWIP technology as an alternative to long wavelength Mercury Cadmium Telluride
- PI is collaborating closely with the ES Directorate at GSFC for the insertion of QWIP in future ESE Missions
- Recipient of ACT award to continue the development of the QWIP technology by increasing the array format to 1K x 1K





Product Line : Passive Optical

TRL=2_{in}-5_{out}

Future Plans

- **Plans for this year . . .**
  - **Complete ATIP Mid Phase and Final Reviews**
  - **Finalize all ACT awards and conduct technical reviews**
  - **Continue to seek Technology Infusion Opportunities**
  - **Prepare 3rd Advanced Component Technology solicitation to be released in 2004**